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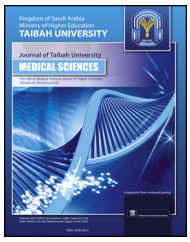

Original Article

A 5-year trend of myocardial infarction, hypertension, stroke and diabetes mellitus in gender and different age groups in Erzurum, Turkey

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الملخص

أهداف البحث: التحقق من توجه ومخاطر الإصابة بأمراض تصلب الشرايين التاجية، واحتشاء عضلة القلب، وارتفاع ضغط الدم، والسكتة الدماغية، والأمراض الدماغية الوعائية، وداء السكري من النوع الثاني عند الجنسين في مختلف الفئات العمرية.

طرق البحث: أجريت دراسة استعادية لبيانات المرضى لمدة 5 سنوات (من 1 يناير 2007 إلى 31 ديسمبر 2011) المسجلين بمستشفى أتاتورك الجامعي، الذي لديه نظام تسجيل لقاعدة البيانات على أساس التصنيف الدولي للأمراض. وقد شملت الدراسة 88293 مريضا. وتم استخدام نموذج الانحدار اللوجستي، لتقييم تأثير مجموعة من المتغيرات (على جنس المريض وتفاعله مع التقدم في السن) مع القيام بالحسابات الإحصائية اللازمة.

النتائج: من بين 88293 مريضا، كان 45% (39514) من الإناث، بمتوسط عمر 56.86 +16.23 عاماً. وكانت نسبة الإناث مهيمنة في جميع الفئات العمرية من داء السكري من النوع الثاني. في حين كانت نسبة الذكور أعلى عند مرضى ارتفاع ضغط الدم، والسكتات الدماغية، وتصلب الشرايين القلبية في جميع الفئات العمرية عدا مرحلة الشباب. كما وجد أن لدى الإناث نسبة خطورة عالية للإصابة بالسكري من النوع الثاني، في حين أن نسبة الخطورة كانت منخفضة لديهن لأمراض تصلب الشرايين القلبية وأعلى قليلا للأمراض القلبية بشكل عام.

الاستنتاجات: أظهرت النتائج ارتفاع نسبة الإناث المصابات بداء السكري من النوع الثاني، وكذلك بين الفئة العمرية الشابة لأمراض القلب والأوعية الدموية الأخرى ولديهن عوامل خطورة أعلى.

الكلمات المفتاحية: صحة القلب والأوعية الدموية; الفرق بين الجنسين; مشاكل القلب والأوعية الدموية; داء السكري

Abstract

Objective: To investigate the trend and risk of coronary artery diseases (CAD), myocardial Infarction (MI), hypertension (HT), stroke, cerebrovascular disease (CVD), and diabetes mellitus type 2 (DMT2) as regard to different age groups and gender.

Methods: We retrieved retrospectively almost 5-year data (January 1st 2007 through December 31st 2011) from the Ataturk university hospital that has database registry system based on International Classification of Diseases (ICD-10). We included 88,293 patients in this analysis. A logistic-regression model was used to assess the effect of groups of variables on the associations of interest (sex and its interaction with age) with calculation of odds ratios with their 95 percent confidence intervals.

Results: Out of 88,293 patients, 45% (39,514) were females and mean age was 56.86 ± 16.23. The females were dominant ($P = 0.001$) in all age groups in diabetes type 2. Whereas in case of hypertension, CAD and strokes except in young age groups males were more prominent. We found that females had high risk 1.54 (95% CI, 1.50 −1.59) for diabetes mellitus while for other

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cardiovascular disease females had lower risk except a slightly high risk for overall CVD (1.01; 95% CI, 0.93 −1.09).

Conclusion: The results demonstrated that for diabetes type 2 and young age group for other cardiovascular diseases females are dominant and have higher risk.

Keywords: Cardiovascular events; Cardiovascular health; Diabetes mellitus; Gender difference

Introduction

Cardiovascular health mainly related to the whole system consists of heart and blood vessels[1] and it damages when main arteries are affected due to atherosclerosis. This is a process marked by abnormal buildup of fat, cholesterol and other substances in the inner lining of the arteries causes a more serious consequences especially when it affects the blood supply to the heart (causing angina or heart attack) or to the brain (causing a stroke).[2] Nevertheless this whole process relates to the risk factors for cardiovascular morbidity and mortality that include those that are inherently non-modifiable (gender, age, family history) and those that are modifiable through behavioral changes and improving self-care (obesity, smoking, diabetes, hypertension and dyslipidemia).[3]

Eventually there are always two main non-modifiable characteristics: age and gender to be taken into account while we are discussing about morbidity or mortality patterns and these both can influence clinical presentation of fatal diseases including acute myocardial infarction,[4–7] diabetes mellitus,[8,9] cardiovascular disease, hypertension and stroke.[10] The literature[5–7] demonstrated that females with acute myocardial infarction, in addition to being approximately 10 years older than males, have a higher incidence of systemic arterial hypertension, diabetes mellitus, normal coronary arteries, and clinical signs of heart failure. Furthermore differences between men and women with diabetes have been also reported and it has been shown that fatality rates are higher for women with DM and acute myocardial infarction than for their male counterparts. The increased risk of cardiovascular disease that accompanies type 2 DM is greater for women than it is for men.[8,9] A significant association was also illustrated between DM and functioning, especially in women.[11,12]

Though incidence and the progression rate of cardiovascular disease and hypertension (CVDH) are markedly higher in men than in age-matched premenopausal women. After menopause, this high ratio does not continue.[13–15] A review article mainly based on studies from Western Europe showed that stroke incidence was about 30% higher in men than in women. The study showed that male patients are on average younger than female when they got their first stroke.[10]

Thus it is proven that there are differences in diseases as regards to sex and age. It has been debated too much during recent years and a considerable number of articles have been published which add new knowledge on epidemiological differences between the gender and age groups in different parts of the world. However it seems that so far this kind of detailed and comprehensive data is not available in Turkey especially from Eastern region. Therefore the purpose of this study as Cardiovascular Health Analysis (CHA) is to give an update and insight on the current knowledge within this field as regard to specific age groups and gender in order to make a plan for preventing cardiovascular diseases and promoting cardiovascular health especially for women so far neglected group.

Materials and Methods

Study design

This is a retrospective epidemiological exploratory study.

Setting

Ataturk University Hospital is a tertiary care teaching hospital. It includes nearly all specialties wards and deals with all kind of patients. It is the only main referral and tertiary care hospital with 1362 bed and gives service to almost 700,000 inhabitants in the Erzurum province that covers 19 districts. The total population of the Eastern Anatolia region is 6,100,000 (2000 census).[16]

Patients

The hospital has an impressive database registry system on linked to national database system. International Classification of Diseases (ICD) codes use for all registered case as standard for database. In fact this system applied in July 2007 and now International Classification of Diseases (ICD-10) is using for database. We retrieved all data from January 2007 to December 2011. The hospital consecutively enrolls all patients as diagnosed and registered by physicians based ICD-10.

By December 2011, within four and half year a total of 30,331,973 visits had been enrolled to the hospital. In the current analysis, we excluded all other patients who were enrolled for other than Diabetes Mellitus, Hypertension, Coronary Heart Diseases, and Cerebrovascular Diseases. We also excluded patients with missing information on age, patients who were 110 years of age or older, and patients who were less than 18 years of age, since myocardial infarction, hypertension and stroke are rare in this age group. Therefore, 88,293 patients (39,514 men and 48,779 women) were included in this analysis.

Clinical variables

Information on clinical variables (Table 1) abstracted from the medical records of the hospital were based on International Classification of Diseases version 10.[17]

Statistical analysis

First, we compared the prevalence of different diseases based on ICD-10 among women and men according to age groups. Next, we compared the baseline characteristics of the women and men with the use of four age groups (30–59 years, 60–69 years, 70–79 years, and 80 and over years). We then used a series of logistic regression models to assess the effect of groups of variables on the associations of interest (sex and its interaction with age). We calculated odds ratios with 95 percent confidence intervals from these models.

The first model included sex as an explanatory variable. In subsequent models, we added sequentially age, the interaction between sex and age with coexisting conditions (myocardial infarction, angina, congestive heart failure, stroke, hypertension, and diabetes). Logistic regression linear model was applied to calculate the risk among gender, and age groups in different ages.

Results

Mean age of 88,293 patients was 56.86 ± 16.23, and out of the total, 45% (39,514) were females. In total 36.4% were diabetic type 2 (DMT2) patients, 31.7% were hypertensive, 24.2% had coronary artery diseases (CAD) and 7.7% were reported as cerebrovascular disease (CVD) cases. Table 2 illustrates that while compared these four major groups with gender and age groups. Females were dominant ($p = 0.001$) in all age groups in diabetes type 2. In group-II, the number of patients with DMT2 is more prominent ($p = 0.001$). In case of hypertension, female dominance is obvious ($p = 0.001$) in all age groups except group-IV. Group-III had a higher rate of hypertension. On contrast, in CAD, a male dominance was found. The highest rate of CAD was belonging to group III. Young females had high problem of CVD while high rate was found in group-III ($p = 0.001$).

Table 1: International Classification of Diseases version 10 (ICD-10).

ICD – Codes	Diagnosis codes matching diseases
Ischemic heart disease	
I20	Unstable angina pectoris
12.1	Stable angina pectoris
120.9	Other angina pectoris
121.0	Acute transmural myocardial infarction of anterior wall
122.1	Acute transmural myocardial infarction of inferior wall
121.4	Acute subendocardial myocardial infarction
128.8	Other acute MI
I24	Acute coronary syndrome
Diabetes mellitus	
E11	Type 2 diabetes mellitus
Hypertensive diseases	
I10	Essential (primary) hypertension
I14	Secondary hypertension
Cerebrovascular diseases	
I60	No traumatic subarachnoid hemorrhage
I61	No traumatic intracerebral hemorrhage
I63	Cerebral infarction
I66	Other cerebrovascular diseases

Figure 1 demonstrates the trend during the study period (2007–2011) and highlighted that there was an up surged in 2008–2010 and then cases numbers declining thereafter in 2011. In 2007, there was not much difference in case enrollment as regard to gender of patients however from 2008 to 2011 there is big gap in between males and females. The Figure 2 depicted year-wise distribution of cases from four major groups of diseases. It shades light that DMT2 and hypertension were dominant in all five years data whereas in 2010 DMT2 was around 40% and highest among all however it declined to 10% in 2011.

Furthermore sub-classification of ICD-10 and its age and gender-wise comparison are shown in Table 3. The results demonstrated a significant ($p = 0.001$) difference among all sub-classes and gender. Almost 64% of the female patients were reported as DMT2, 63% as essential hypertension, and similarly 60% as secondary hypertension. Almost 69% of the males had unstable angina pectoris. Stable angina cases were reported higher in males (60.4%). The other angina pains were reported 65% in males as well. Myocardial infarction was always higher in males while acute inferior myocardial infarction was the highest in males (76.3%) among all infarctions. Acute Coronary Syndrome was also high in males (67.5%). The situation of cerebrovascular diseases was not very different; for instance, 53.1% of male patients were diagnosed as sub-arachnoid hemorrhage, 55.3% of male patients as intracerebral hemorrhage, almost 53% as cerebral infarction. However, cerebrovascular diseases were higher in females (56.6%).

Obviously DMT2 was higher (41.5%) in group-II. Interestingly followed (27.1%) by younger age group I who were less than 40 years. Essential (44.1%), secondary (48.8%) hypertension, unstable angina (52%), stable angina (44.5%), acute inferior myocardial infarction (51.4%), acute coronary syndrome (49.5%), sub-arachnoids hemorrhage (39.3%) and cerebrovascular diseases (33%) were higher among group III, followed by other age groups as mentioned in the table. It is also interesting to know that among group II, males (42.9%) diabetes mellitus as compared to other groups.

When we calculated odds (Table 4), we found that females had a high risk 1.54 (95% CI, 1.50–1.59) for diabetes mellitus while as compared to young age group (18–40 years) all other groups had less risk. For instance, group II had odds ratio: 0.531 (95% CI, 0.51–0.55), and group III had odds ratio: 0.30 (95% CI, 0.28–0.30). The situation of hypertension in gender is also similar to diabetes and females had high odds: 1.64 (95% CI, 1.59–1.69) as compared to males, whereas it is slightly different in age groups, the risk increases as age increases [(Group II: 1.54; 95% CI, 1.47–1.61), (Group III: 1.98; 95% CI, 1.89–2.07), and (Group IV: 2.00; 95% CI, 1.86–2.15)] for essential hypertension. The similar risk pattern is seen for secondary hypertension too. In case of angina pectoris, whether unstable, stable or other females had less risk as compared to males. However the same pattern shown for all anginas as shown for essential hypertension i.e., if age increases the risk of development of angina will also increases, for instance in unstable angina [(Group II: 4.324; 95% CI, 3.27–5.69), (Group III: 5.42; 95% CI, 4.12–7.12), and (Group IV: 6.62; 95% CI, 4.87–8.98)].

Table 2: Age and gender distribution of four major diseases.

Four major groups of disease (ICD-10)		Age groups								Total	
		Group I 18–40 years		Group II 41–60 years		Group III 61–80 years		Group IV 81–109 years			
		N	%	*N*	%	*N*	%	*N*	%	*N*	%
DM type 2 ($p = 0.001$)	Male	2539	21.6	5040	42.9	3846	32.7	333	2.8	11,758	100.0
	Female	6178	30.3	8315	40.7	5393	26.4	525	2.6	20,411	100.0
Hypertension ($p = 0.001$)	Male	1285	12.4	3457	33.4	4936	47.6	683	6.6	10,361	100.0
	Female	2146	12.2	6797	38.5	7501	42.5	1200	6.8	17,644	100.0
Coronary artery diseases ($p = 0.001$)	Male	1078	7.7	5699	40.6	6466	46.0	803	5.7	14,046	100.0
	Female	605	8.3	2673	36.7	3336	45.8	677	9.3	7291	100.0
Cerebrovascular diseases ($p = 0.001$)	Male	460	13.7	846	25.3	1649	49.2	394	11.8	3349	100.0
	Female	778	22.7	839	24.4	1371	39.9	445	13.0	3433	100.0
Total		15,069	17.1	33,666	38.1	34,498	39.1	5060	5.7	88,293	100.0

N = Numbers; % = Percentages.

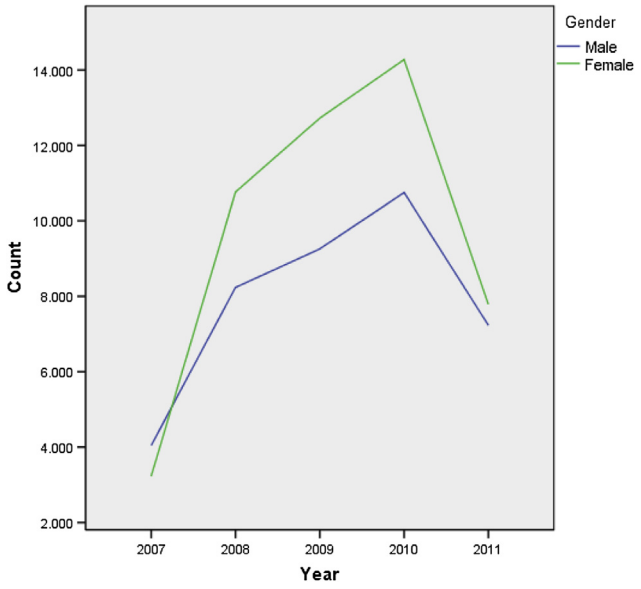

Figure 1: Year & gender wise frequency of patients.

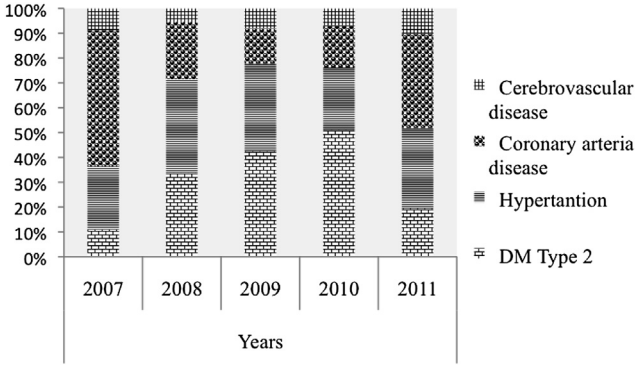

Figure 2: Year wise distributions of cases from four major groups of diseases.

Similarly females had lower risk for development of myocardial infarction (MI), acute coronary syndrome, subarachnoids and intracerebral hemorrhage, and cerebral infarction, whereas had slightly high risk for overall cerebrovascular diseases (1.01; 95% CI, 0.93–1.09). The odds for development of acute inferior MI is higher in group III (3.70; 95% CI, 2.13–6.41), while subendocardial infarction is higher in very old people [(Group IV: 10.33; 95% CI, 3.07–34.69)] and acute coronary syndrome is higher in elderly [(Group III: 2.81; 95% CI, 2.21–3.58)]. The risk for sub-arachnoid and intracerebral hemorrhage increases as age is increasing (Table 4).

Discussion

Though this study is retrospective and hospital based, due to two reasons the results are valuable: a large period of the study that developed a large number of data for analyses and it includes myocardial infarction and stroke for which hospital's data is to be considered as reliable as for diabetes and hypertension in the community. This study depicted the main differences with regard to clinical events in-hospital seen during 5-year period among women as compared to men and among different age groups.

Some results are consistent with previous[18,19] findings like slightly over than one-third of patients were diagnosed as DMT2, one-third HT, nearly quarter had been diagnosed as CAD and less than 10% as CVD. However we found some very interesting different results, for instance in all major groups, females were more prominent. This result is similar to the results published in a study[20] done in Konya, which showed that the crude impaired fasting glucose rate was 24% (27.1% in women and 18.5% in men), however the diabetes rate 8.4% with slight predominance of men (9.1%). Further the survey identified previously undiagnosed diabetes in 3.7% (4.3% of women and 2.9% of men). The same study depicted that the prevalence of diabetes and obesity increased with age. The increased risk of cardiovascular disease that accompanies type 2 DM is greater for women than it is for men.[8,9] It has also been illustrated that there is a significant association between

DM and performance and daily functioning, especially in women.[11,12]

There was an interesting finding during the study period as demonstrated an up-surge in 2008−2010 and then cases numbers declining thereafter in 2011. In 2007, there was not much difference in case enrollment as regard to gender of patients. However from 2008−2011 there is big gap between females and males. The national or international literature witnessed that women visit health services more as compared to men. For instance a recent study[21] showed that the mean number of clinic visits for women was 25.2 (SD ± 30.2) and for men 17.6 (SD ± 24.1) that reinforced our study results. However why it happened particularly in 2008 through 2011 cannot be explained.

The year-wise distribution of cases from four major groups of diseases shaded light that DMT2 and hypertension were dominant in all five years data whereas in 2010 DMT2 was around 40% and highest among all, however it declined to 10% in 2011.

Though we cannot compare these admission results directly with the results of the prevalence studies, but might reflects the seriousness of the problems in the province. Indeed the hospital's data help us to estimate the problem and predict the burden in the community.[22] The other study demonstrated around 8% in other parts of Turkey,[20] which is almost similar to our results of 2011. Another study[23] also illustrated that prevalence of DM in Turkish adults was estimated as 11.0%, which were second by several studies[24−27] by showing prevalence from the 7% to 12%. One argument for high reporting of diabetes during 2010 is that it was a year of making changes in ICD-10 classification so we are suspecting that the main problem was in coding and feeding of data. This is one of main limitations of retrospective study design. Furthermore the results highlighted that hypertension was reported around 10%−20% during last five years. These results are not much different from other studies; a study[28] showed that overall, prevalence of "at risk of overweight" and "overweight" were found to be 10.7% and 3.2%, respectively whereas another study[29] depicted inconsistent results and demonstrated that the overall prevalence rate of hypertension was 59.5%

Table 3: Comparison of age groups and gender as regard to sub-classes of ICD-10 cardiovascular diseases and diabetes type 2.

Sub-classes of ICD-10 codes		Age groups								Total	
		Group I 18−40 years		Group II 41−60 years		Group III 61−80 years		Group IV 81−109 years			
		N	%	*N*	%	*N*	%	*N*	%	*N*	%
DM type 2	Male	2539	21.6	5040	42.9	3846	32.7	333	2.8	11,758	100.0
	Female	6178	30.3	8315	40.7	5393	26.4	525	2.6	20,411	100.0
Essential hypertension	Male	1192	12.4	3237	33.7	4542	47.3	622	6.5	9593	100.0
	Female	2030	12.3	6406	38.8	6961	42.2	1102	6.7	16,499	100.0
Secondary hypertension	Male	93	12.1	221	28.7	394	51.2	61	7.9	769	100.0
	Female	115	10.1	392	34.3	539	47.1	98	8.6	1144	100.0
Unstable angina pectoris	Male	41	3.1	480	36.6	679	51.8	112	8.5	1312	100.0
	Female	14	2.3	199	33.2	315	52.5	72	12.0	600	100.0
Stable angina pectoris	Male	398	10.8	1446	39.4	1641	44.7	185	5.0	3670	100.0
	Female	213	8.9	939	39.1	1064	44.3	188	7.8	2404	100.0
Other angina pectoris	Male	434	8.4	2245	43.5	2247	43.5	238	4.6	5164	100.0
	Female	263	9.5	1125	40.7	1173	42.5	201	7.3	2762	100.0
	Female	77	7.6	235	23.1	539	53.0	166	16.3	1017	100.0
Acute transmural myocardial infarction of anterior wall	Male	0	0.0	6	75.0	1	12.5	1	12.5	8	100.0
	Female	1	16.7	1	16.7	4	66.7	0	0.0	6	100.0
Acute transmural myocardial infarction of inferior wall	Male	13	5.4	100	41.3	118	48.8	11	4.5	242	100.0
	Female	1	1.3	21	28.0	45	60.0	8	10.7	75	100.0
Acute subendocardial MI	Male	3	1.8	61	35.7	97	56.7	10	5.8	171	100.0
	Female	0	0.0	11	23.9	23	50.0	12	26.1	46	100.0
Other AMI	Male	149	5.6	1060	39.5	1270	47.4	202	7.5	2681	100.0
	Female	77	7.6	235	23.1	539	53.0	166	16.3	1017	100.0
Acute coronary syndrome	Male	40	5.0	301	37.9	410	51.6	44	5.5	795	100.0
	Female	36	9.4	143	37.4	173	45.3	30	7.9	382	100.0
Subarachnoid hemorrhage	Male	76	23.5	110	34.0	121	37.3	17	5.2	324	100.0
	Female	38	13.3	109	38.1	119	41.6	20	7.0	286	100.0
Intracerebral hemorrhage	Male	48	7.0	139	20.2	402	58.3	100	14.5	689	100.0
	Female	47	8.5	132	23.7	295	53.1	82	14.7	556	100.0
Cerebral infarction	Male	63	5.7	212	19.1	643	58.0	191	17.2	1109	100.0
	Female	78	7.9	156	15.8	505	51.0	251	25.4	990	100.0
Cerebrovascular diseases	Male	273	22.2	387	31.5	483	39.3	86	7.0	1229	100.0
	Female	615	38.4	443	27.7	451	28.2	92	5.7	1601	100.0
	Female	213	8.9	939	39.1	1064	44.3	188	7.8	2404	100.0

N = Numbers; % = Percentages.

($n = 710$), being 58.0% in men and 60.9% in women ($P > 0.05$) and the overall age-adjusted and sex-adjusted prevalence of hypertension was 31.8%, and it was higher in women than in men (36.1 versus 27.5%, $P < 0.001$),[30] even there is an evidence of hypertension among 4.4% ($n = 45$) of the students[31] in Turkey.

The condition of cerebrovascular diseases (CVD) is not much different in our data as it is consistent with other study[32] which showed that CVD are also the second leading cause of death in Turkey, accounting for 15% of all deaths and they have the third place in loss of disability adjusted life years (DALY) estimates with a rate of 5.9% in Turkey. The study also showed the rates of hemorrhagic stroke is higher (17–29%) in Turkey compared to many European countries. Since CVDs are leading causes of deaths, they have high importance in terms health devastating health problem. Acute coronary artery diseases were also reported in the same range with variation in different years.

Let's see the individual results based ICD-10 classification of diseases; the results demonstrated a significant ($p = 0.001$) difference among all sub-classes and gender. The results

Table 4: Risk calculation for gender and age groups.

Sub-classes of ICD-10 codes	Females[a] Odds (95% CI)	Age groups[b]		
		Group II 41–60 year Odds (95% CI)	Group III 61–80 year Odds (95% CI)	Group IV 81–109 year Odds (95% CI)
DM type 2	1.548 (1.50–1.59) $P = 0.001$	0.531 (0.51–0.55) $P = 0.001$	0.301 (0.28–0.31) $P = 0.002$	0.163 (0.15–0.17) $P = 0.001$
Essential hypertension	1.645 (1.59–1.69) $P = 0.001$	1.545 (1.47–1.61) $P = 0.001$	1.981 (1.89–2.07) $P = 0.001$	2.00 (1.86–2.15) $P = 0.001$
Secondary hypertension	1.360 (1.23–1.49) $P = 0.001$	1.188 (1.01–1.39) $P = 0.001$	1.643 (1.40–1.91) $P = 0.001$	1.742 (1.40–2.15) $P = 0.001$
Unstable angina pectoris	0.412 (0.37–0.45) $P = 0.001$	4.321 (3.27–5.69) $P = 0.003$	5.420 (4.12–7.12) $P = 0.001$	6.620 (4.87–8.98) $P = 0.001$
Stable angina pectoris	0.521 (0.49–0.54) $P = 0.001$	1.776 (1.62–1.94) $P = 0.003$	2.054 (1.87–1.94) $P = 0.001$	2.131 (1.86–2.43) $P = 0.001$
Other angina pectoris	0.436 (0.41–0.45) $P = 0.001$	1.733 (1.58–1.89) $P = 0.001$	1.474 (1.35–1.60) $P = 0.001$	1.207 (1.05–1.37) $P = 0.001$
Acute transmural myocardial infarction of anterior wall	0.672 (0.23–1.95) $P = 0.001$	2.504 (0.30–20.59) $P = 0.000$	1.557 (0.12–32.72) $P = 0.001$	1.996 (0.122–32.72) $P = 0.001$
Acute transmural myocardial infarction of inferior wall	0.304 (0.23–0.39) $P = 0.001$	2.949 (1.69–5.14) $P = 0.001$	3.703 (2.13–6.41) $P = 0.001$	3.314 (1.65–6.65) $P = 0.001$
Acute subendocardial MI	0.270 (0.19–0.37) $P = 0.001$	7.032 (2.20–22.38) $P = 0.001$	8.898 (2.84–28.35) $P = 0.003$	10.330 (3.07–34.69) $P = 0.001$
Other acute MI	0.313 (0.29–0.33) $P = 0.001$	2.389 (2.06–2.75) $P = 0.001$	3.291 (2.85–3.79) $P = 0.001$	5.312 (4.47–6.30) $P = 0.001$
Acute coronary syndrome	0.421 (0.37–0.47) $P = 0.001$	2.295 (1.79–2.93) $P = 0.001$	2.817 (2.213–3.58) $P = 0.001$	2.573 (1.86–3.55) $P = 0.004$
Subarachnoid hemorrhage	0.718 (0.61–0.84) $P = 0.001$	0.777 (0.61–0.97) $P = 0.30$	0.767 (0.61–0.96) $P = 0.23$	0.776 (0.53–1.12) $P = 0.185$
Intracerebral hemorrhage	0.712 (0.63–0.79) $P = 0.002$	1.135 (0.89–1.43) $P = 0.292$	2.661 (2.14–3.30) $P = 0.001$	4.637 (3.60–3.30) $P = 0.001$
Cerebral infarction	0.751 (0.68–0.82) $P = 0.0002$	1.129 (0.92–1.37) $P = 0.223$	3.422 (2.86–4.08) $P = 0.001$	9.513 (7.83–11.54) $P = 0.003$
Cerebrovascular diseases	1.014 (0.93–1.09) $P = 0.727$	0.426 (0.36–0.46) $P = 0.001$	0.515 (0.46–0.56) $P = 0.000$	0.758 (0.64–0.89) $P = 0.001$

[a] Odds compare to males.
[b] Odds compare to first age group (18–40 years).

showed that around more than half females were suffering from DMT2 and hypertension whereas for angina pectoris, almost more than two third males registered as a case of unstable angina pectoris whereas stable angina cases were reported higher in males. All myocardial infarction were higher in males while Acute Inferior myocardial infarction was the highest in males among all infarctions. Acute Coronary Syndrome was also high in males. The situation of cerebrovascular diseases was not very different for instance; around fifty percent males were diagnosed as a case of sub-arachnoid hemorrhage, intracerebral hemorrhage, and cerebral infarction, however cerebrovascular diseases were higher in females.

Further analysis of risk calculation through an unadjusted odds ratio showed that females had high risk 1.54 (95% CI, 1.50−1.59) for diabetes mellitus. While age-adjusted odds ratio doesn't demonstrate females' dominance. The literature[5−7] demonstrated predominance in females in addition to being approximately 10 years older than males, have a higher incidence of diabetes mellitus, fatality rates are higher for women with DM.[33] The females were also pre-dominant in hypertension (OR: 1.64 (95% CI, 1.59−1.69), whereas it is slightly different in among age groups as the risk increases as age is increasing for essential hypertension and the similar risk pattern is seen for secondary hypertension too. Which were also second by some other previous studies.[5−7,34] Regarding the risk of development of other cardiac events males showed pre-dominance however age plays a vital role that is already established fact and supported by many literatures. It has been shown that the incidence and the progression rate of cardiovascular disease and hypertension (CVDH) are markedly higher in men than in age-matched premenopausal women,[1] however after menopause, there is no gender difference found in risk of development of CVDH therefore it is stated that incidence as well as the rate of progression of CVDH is very similar in women and men[13−15] in later ages. Similarly females had lower risk for Sub-arachnoid and Intracerebral hemorrhage, and Cerebral Infarction, whereas had slightly high risk for overall Cerebrovascular diseases (OR: 1.01; 95% CI, 0.93−1.09). It is also supported by an article[10] published from Western Europe that showed stroke incidence was about 30% higher in men than in women. However it also demonstrates that on average male patients are younger than female when they got their first stroke. In Turkey, CVD is second leading cause of death[32] made it unequivocal important disease.

Limitations of the study

Some limitations should be considered in assessing the results of our study. First, this study has been conducted retrospectively only at one hospital however this hospital is a main tertiary care centre of Erzurum province, but retrospective study it has well-known some disadvantages of date collection etc. Second, in this study, we didn't have information about other risk factors like smoking status, life style, high cholesterol, high triglyceride etc. In fact, if these information were evaluated, the adjustments can be done and additional data could be provided.

In conclusion, the study provides current data highlighted the pattern of four major diseases DMT2, HT, cardiovascular events and cerebrovascular diseases during last almost five year based on gender and age differences. This data will be helpful to use a reference for further planning to control diseases and fatality rates especially for women.

Conflict of interest

The authors have no conflict of interest to declare.

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